



STRATEGIC BEHAVIOR AND DYNAMIC CAPABILITIES: STUDIES IN MICRO AND SMALL TECHNOLOGY-BASED FIRMS

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Purpose: This work aims to contribute to the literature on strategic management in micro and small firms by identifying the main strategic behavior traits in micro and small technology-based firms.

Methodology: The research method consisted of two phases: the first phase, quantitative, involved a survey of 104 micro and small technology-based firms, whose results were analyzed using the cluster analysis technique. The second qualitative phase involved five case studies, whose information was obtained through five semi-structured interviews and analyzed using the content analysis technique.

Results: The results indicated which micro and small technology-based firms operate in sectors with high levels of dynamism and uncertainty, and their strategic behavior is based on the definition of competitive and innovation strategies, communication of strategic objectives to employees, allocation of organizational resources for innovation, market research and investments in R&D and development of dynamic capabilities for innovation, sensing changes in the external environment, seizing and reconfiguring resources, through strategic partnerships with external agents, especially customers, which can help these companies to adapt to market demands and obtain competitive advantages.

Conclusions: The strategic behavior in micro and small technology-based firms is influenced by the definition of competitive and innovation strategies, communication of strategic objectives to employees, allocation of organizational resources for innovation, market research and R&D investments, and development of dynamic capabilities for innovation.

Keywords: Dynamic capabilities, organizational resources, external environment, micro and small technology-based firms.

Comportamiento estratégico y capacidades dinámicas: estudios em microempresas y pequeñas empresas de base tecnológica

Resumén

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Objetivo: Este trabajo pretende contribuir a la literatura sobre gestión estratégica en micro y pequeñas empresas de base tecnológica, identificando las principales características del comportamiento estratégico en esas empresas.

Metodología: El método de investigación utilizado fue el cualitativo, basado en cinco estudios de caso, escogidos por medio de una encuesta aplicada en 104 micro y pequeñas empresas de base tecnológica.

Resultados: Los resultados indicaron que las micro y pequeñas empresas de base tecnológica operan en sectores con altos niveles de dinamismo e incertidumbre, y su comportamiento estratégico se basa en la definición de estrategias competitivas y de innovación, la comunicación de los objetivos estratégicos a los empleados, la asignación de recursos organizativos para innovar, la investigación de mercado y las inversiones en I&D y el desarrollo de capacidades dinámicas para innovar, detectando los cambios en el entorno externo, aprovechando y reconfigurando los recursos, a través de asociaciones estratégicas con agentes externos, especialmente los clientes, que pueden ayudar a estas empresas a adaptarse a las demandas del mercado y obtener ventajas competitivas.

Conclusiones: El comportamiento estratégico en las microempresas y pequeñas empresas basadas en la tecnología está influenciado por la definición de estrategias competitivas y de innovación, la comunicación de objetivos estratégicos a los empleados, la asignación de recursos organizativos para innovar, investigación de mercado e inversiones en I&D y desarrollo de capacidades dinámicas para innovar.

Palabras clave: Capacidades dinámicas, recursos organizativos, entorno externo, microempresas y pequeñas empresas de base tecnológica.

Comportamento estratégico e capacidades dinâmicas: estudo de casos em micro e pequenas empresas de base tecnológica

Resumo

Objetivo: Este trabalho visa contribuir para a literatura sobre administração estratégica em micro e pequenas empresas, ao identificar os principais traços do comportamento estratégicos em micro e pequenas empresas de base tecnológica.

Metodologia: O método de pesquisa consistiu em 2 fases: a primeira fase, quantitativa, envolveu um survey com 104 micro e pequenas empresas de base tecnológica, cujos resultados foram analisados por meio da técnica de análise de clusters. A segunda fase, qualitativa, envolveu cinco estudos de casos, cujas informações foram obtidas por meio de cinco entrevistas semiestructuras e analisadas por meio da técnica de análise de conteúdo.

Resultados: Os resultados indicaram que micro e pequenas de base tecnológica operam em setores caracterizados por elevados níveis de dinamismo e incerteza, e seus comportamentos estratégicos estão baseado na definição de estratégias competitiva e de inovação, comunicação dos objetivos estratégicos aos funcionários, alocação de recursos organizacionais para inovar, pesquisar o mercado, investir em P&D e desenvolver capacidades dinâmicas para inovar, detectando mudanças no ambiente externo, mobilizando e reconfigurando recursos organizacionais, por meio de parcerias estratégicas com agentes externos, especialmente clientes, que podem ajudar essas empresas e a se adaptarem as demandas de mercado e obter vantagens competitivas.

Conclusões: O comportamento estratégico em micro e pequenas empresas de base tecnológica é influenciado pela definição de estratégias competitivas e de inovação, comunicação de objetivos estratégicos aos colaboradores, alocação de recursos organizacionais para inovar, pesquisa de mercado e investimentos em P&D e desenvolvimento de capacidades dinâmicas para inovar.

Palavras-chaves: Capacidades dinâmicas, recursos organizacionais, ambiente externo, micro e pequenas empresas de base tecnológica.

1 Introduction

In the current competitive scenario, where new products and technologies often emerge in any industry, companies need to develop dynamic capabilities to survive (Adam, Strähle, & Freise, 2018). Therefore, an indispensable condition is understanding the environment they are inserted (Turulja & Bajgoric, 2019). In addition, environmental characteristics may compel enterprises to interact with external variables and reconfigure their resources and capabilities to develop processes, products, and services (Haapanen, Hurmelinna-Laukkanen, & Hermes, 2018).

The capability to reconfigure organizational resources is essential in dynamic environments where competitive advantages can be temporary (Adam et al., 2018). Enterprises in dynamic environments also face rapid product obsolescence, changes in competitors' positions, and changes demanded by customers. Managers must invest in research and development (R&D) to search for new knowledge (Adam et al., 2018; Turulja & Bajgoric, 2019).

Among the companies in dynamic environments, micro and small technology-based firms (STBFs) play a significant role in the socioeconomic development of nations, contribute innovation and qualified workforce, stimulate the scientific-technological process, and facilitate the interconnection among economic sectors (Ko & Liu, 2017; Jensen & Clausen, 2017). Although STBFs have managerial specificities, such as the limitations of organizational resources, they must employ methods to allocate resources and survive in dynamic environments (Ko & Liu, 2017). Therefore, dynamic capabilities stand out among the theories supporting STBFs reconfiguring their resources. Also, this theory is used to sense, seize, and reconfigure organizational resources as external demands change (Herrmann, Sangalli, & Teece, 2017; Schoemaker, Heaton, & Teece, 2018).

Authors have already studied the relationship between dynamic capabilities and innovation. Herrmann et al. (2017) analyzed how dynamic capabilities assist in developing an innovation environment. Jannssen, Castaldi, and Alexiev (2016) studied how microfoundations of dynamic capabilities influence the development of service innovations. A survey of 391 Dutch companies in various sectors shows that detecting customer needs and new technological options are the microfoundations that most influence fostering service innovations. Kallmuenzer and Scholl-Grissmann (2017) evaluated how micro and small family businesses use their organizational resources to innovate. A survey of 152 micro and small family businesses in Germany, Austria, and Switzerland indicated that external knowledge, detection

of technological opportunities, and inter-organizational cooperation are the basis for innovation. Nieves, Quintava, and Osorio (2016) analyzed the multiple and simultaneous relationships among organizational knowledge, dynamic capabilities, and innovation. A survey of 525 Spanish companies in the tourism sector indicated that knowledge and knowledge-based processes foster innovation in hotel firms. Teece (2012, 2018) analyzed the role of executives in developing dynamic capabilities and their effects on organizational business models.

About the intersection between dynamic capabilities and micro and small businesses, Adam et al. (2018) investigated the microfoundations that reinforce the formation of dynamic capabilities. Five case studies with micro and small German clothing industry managers indicated that dynamic capabilities emerged through customer interaction, external knowledge, delegating tasks, and sharing strategic information. Boly, Morel, Assielou, & Camargo (2014) elaborated an innovation capacity measure framework based on dynamic capabilities. A survey of 39 French micro and small businesses in the manufacturing industry indicated that a framework must consider resource allocation, competence management, learning, R&D investments, manufacturing, marketing, customer needs, and organizational and strategic capabilities. Haapanen et al. (2018) investigated how allocating organizational resources influences achieving sustainable competitive advantages. Eight case studies with managers of Finnish STBFs indicated that investments in marketing and R&D and the ability of companies to formulate their strategies are strategic resources that companies use to obtain sustainable competitive advantages. Jensen & Clausen (2017) investigated the origins of exploration and exploitation capabilities in STBFs. A survey of 84 Norwegian STBFs indicated that knowledge accumulated by managers and the development of organizational routines influence the development of exploration and exploitation capabilities. Ko and Liu (2017) explained how competitive strategies and dynamic capabilities contribute to obtaining a competitive advantage. A survey of 214 STBFs in the UK indicated that developing competitive strategies assists in dynamic capabilities and investments in R&D. Sok, O'Cass, & Miles (2016) investigated how product innovation and dynamic capabilities enhance the financial performance micro and small businesses. A survey of 160 micro and small Cambodian companies showed that the businesses that obtained the best financial results were the companies that presented synergy and interconnection between their resources.

However, no article used multiple case studies to verify how dynamic capabilities and innovation influence the strategic behavior of STBFs. Thus, this work aims to identify the main strategic behavior traits in STBFs. Consequently, the following research question was formulated: What are the main traits of strategic behavior in STBFs? Strategic behavior will be

analyzed by defining and formalizing competitive and innovation strategies, variables that make up the external environment, resource allocation to innovate, and dynamic capabilities development.

This study used quantitative and qualitative research to analyze relations among dynamic capabilities, innovation, and STBFs. The quantitative survey was conducted with 104 STBFs in Sao Paulo. The responses of 104 STBFs were submitted to cluster analysis with the objective of grouping based on criteria such as investments in R&D, allocation of organizational resources to innovate, and quantity of innovations launched and improved in processes, products, and services, STBFs for the realization of the next stage, qualitative. In the qualitative stage, 5 STBFs were chosen to conduct case studies using semi-structured interviews, and the content analysis technique analyzed their results.

The article is presented as follows: Section 2 presents the theoretical framework, highlighting the concepts related to organizational resources, dynamic capabilities, and STBFs. Section 3 describes the research method. Section 4 shows the results, and section 5 discusses the results of the previous session. Finally, some concluding remarks are made in section 6.

2 Theoretical Framework

The theoretical framework is based on competitive and innovation strategies, dynamic capabilities, and STBFs.

2.1 Competitive and innovation strategies

At the beginning of the 20th century, new products and technologies emerged from any industry and worldwide. In this new scenario, administrative studies seeking solutions to new business challenges help companies reduce uncertainty (Sheng, 2017). Moreover, among the administrative technics, competitive strategy guides companies to obtain decision and action patterns in the external environment (Jensen & Clausen, 2017).

The competitive strategy represents strategic alternatives enterprises have to adapt to new external demands by developing and using their resources and capabilities (Sheng, 2017). In turn, innovation can be defined as combining new and existing internal technologies with the creative use of external technologies, resulting in the introduction of a new product, process, or service in the market (Hsiao & Hsu, 2018). As a result, innovation allows companies to use their resources and capabilities more efficiently, ensuring performance effectiveness in their

sectors, penetration in new market niches, and long-term performance (Jensen & Clausen, 2017; Teece, 2007).

The integration between strategy and innovation, forming the innovation strategy, gives enterprises in-depth knowledge of their activities. At the same time, it can help them develop innovations through strategic approaches that monitor external and internal organizational environments (Jensen & Clausen, 2017). Innovation strategy refers to the politics enterprises use to direct their innovative efforts, choosing their objectives, methods, and paths to develop and use their innovative potential and better allocate their resources (Sheng, 2017).

2.2 Organizational resources

Organizational resources are the inputs of the productive process an enterprise owns, controls, or accesses. They can be used to form innovation strategies and are classified as tangible and intangible (Barney & Hesterly, 2012). Tangible resources are easy to evaluate, quantify, negotiate and include equipment, stocks, and facilities. On the other hand, intangible resources are challenging to evaluate because they cover assets usually rooted in the history and culture of organizations, such as brand, knowledge, learning, and reputation (Nieves et al., 2016).

Resources, when strategically combined, become organizational capabilities, which aim to enable enterprises to use their resources in the execution of tasks or activities in an integrated manner (Sheng, 2017). However, for a resource or capability to be considered strategic, it must meet all the requirements of the VRIO model - Valuable, Rare, Inimitable, and Organizational - (Barney & Hesterly, 2012).

2.3 Dynamic capabilities

Knowing the external organizational variables may not be enough for competitive and innovation strategies to be formed because internal organizational aspects, such as resources and capabilities, can be sources of competitive advantage (Mousavi & Bossink, 2018).

The concept of dynamic capabilities analyses the competitive process which can trigger differences in organizational performance, considering how enterprises develop and maintain their resources in dynamic environments. Dynamic capabilities originate from organizational processes and are composed of structures, systems, and cultures applied intending to sense, seize, and reconfigure organizational resources and competencies as external demands change (Schoemaker et al., 2018). Dynamic capabilities are the basis for enterprises to respond to

environmental changes and achieve new forms of competitive advantage, having their origins in the characteristics or changes of the external environment (Mousavi & Bossink, 2018).

The main definitions of dynamic capabilities are expressed in Table 1.

According to Table 1, dynamic capabilities originate from organizational processes (Eisenhardt & Martin, 2000), composed of organizational structures, systems, and cultures, applied to coordinate, integrate, learn, and reconfigure the organizational resource base as external demands change (Teece et al., 1997; Teece, 2007, 2009). According to Helfat et al. (2007), the resource base includes tangible, intangible, and human resources and capabilities that the organization owns, controls, or has access to on a preferential basis.

Table 1

Definitions of dynamic capabilities

Author(es)	Definitions
Amit and Schoemaker (1993)	Firm's capacity to deploy resources, usually in combination, and encapsulate both explicit processes and those tacit elements (such as know-how and leadership) embedded in the processes
Teece et al. (1997)	The firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments;
Eisenhardt and Martin (2000)	Firm processes that utilize resources, including processes for integrating, reconfiguring, gaining, and releasing resources, to match and create market changes
Zollo and Winter (2002)	A dynamic capability is a learned and stable pattern of collective activity. The organization systematically generates and modifies its operating routines for improved effectiveness.
Winter (2003)	Capabilities to operate, increase, modify, or create ordinary capabilities;
Helfat et al. (2007)	The capacity of an organization to purposefully create, extend, and modify its resource base;
Wang and Ahmed (2007)	Firm's behavioral orientation constantly to integrate, reconfigure, renew, and recreate its resources and capabilities and, most importantly, upgrade and reconstruct its core capabilities in response to the changing environment to attain and sustain competitive advantage;
Teece (2007, 2009)	Capabilities necessary for companies to sense external and internal environments, seize and reconfigure resources and organizational structures, to gain competitive advantage
Schoemaker et al. (2018)	The ability to develop, renew and reconfigure new/or existing organizational capabilities

Source: Adapted from Mereilles and Camargo (2014).

Regarding processes, Wang and Ahmed (2009) argued that dynamic capabilities are not simply processes but are embedded in processes. Processes are often explicit or codifiable structuring and combination of resources and thus can be transferred more easily within or across firms.

According to Teece, Pisano, and Schuen (1997), dynamic capabilities are "the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments." Additionally, Teece (2007, 2009) notes that dynamic capabilities can be disaggregated into the capacity (a) to sense and shape opportunities and threats, (b) to seize opportunities, and (c) to maintain competitiveness through enhancing, combining, protecting, and, when necessary, reconfiguring the business enterprise's intangible and tangible assets.

The resource-based view (RBV) was compared to the theory of dynamic capabilities to fully understand the concept of dynamic capabilities. The differences between the two models can be found in Eisenhardt and Martin (2000). Differently shown in the VRIO model, organizational capabilities are not sources of sustainable competitive advantage since the real competitive advantage stems from the capability to reconfigure strategic resources as external demands change. In dynamic markets, dynamic capabilities can be used to build new resource configurations for new competitive positions. Therefore, dynamic environments can limit the effectiveness of RBV for managers to face the challenges of external competition and the obsolescence of internal resources. Although RBV focuses on leveraging resources to obtain a competitive advantage, in dynamic environments, the competitive strategy is formed by several temporary advantages.

When the competition was more substantial, strategic theories refined the original concept of dynamic capabilities to focus on the ability to develop, renew and reconfigure new/or existing organizational capabilities (Schoemaker et al., 2018).

As for their nature, dynamic capabilities are composed of microfoundations (Haapanen et al., 2018; Teece, 2012, 2018). Microfoundations are abilities, processes, procedures, organizational structures, and decision rules enabling dynamic capabilities development and implementation (Teece, 2012, 2018). Therefore, identifying and disaggregating dynamic capabilities using microfoundations can help enterprises to adapt more quickly to new external demands contributing to the effective development of innovation strategy (Haapanen et al., 2018; Teece, 2012, 2018).

In this work, the microfoundations of sensing, seizing, and reconfiguration, proposed by Teece (2012, 2018), were used. Sensing microfoundation describes identifying and evaluating the market and technological opportunities through acquiring new knowledge and monitoring external and internal organizational environments. Seizing microfoundation refers to the ability to capture and seize external opportunities. Finally, reconfiguration microfoundation describes the continuous renewal of organizational resources (Adam et al., 2018; Schoemaker et al., 2018). In this work, dimensions that make up the microfoundations

are also considered, as proposed by Adam et al. (2018), Froehlich, Bitencourt, and Bossle (2017), and Mousavi and Bossink (2018).

2.4 Micro and small technology-based firms

Large companies have long been central to economic, political, and academic debates; however, little significance has been accorded to micro and small firms (MSFs) (Jensen & Clausen, 2017). Nevertheless, for these authors, only from the early 1990s onward have the latter been incorporated as relevant objects in the discussions. These firms contribute to nations' social and economic development and, because of their specificities, require administrative theories adapted to their daily realities (Cho et al., 2017; Ko & Liu, 2017; Lukovszki et al., 2020).

Among MSFs, STBFs stand out as firms that foster innovation. Although it is challenging to characterize STBFs because new technologies transcend the boundaries of traditionally divided industrial sectors, certain factors differentiate them from other MSFs (Côrtes et al., 2005). These characteristics include high R&D investments; development of R&D departments; incentives for scientific research; use of technological knowledge; development of new/improved processes, products, and services by exploring knowledge or technology; high rate of technological obsolescence; use of skilled labor; partnerships with universities; protection of organizational resources through patents and intellectual protection; and high international competition and use of information technology (De Oliveira & Terence, 2018; Jensen & Clausen, 2017; Ko & Liu, 2017). In addition, STBFs aim to explore knowledge, technology, or the results of scientific research by combining capabilities, innovation strategies, and more systematic innovative planning (Jensen & Clausen, 2017; Ko & Liu, 2017).

In short, the main differences between MSFs and STBFs are presented in Table 2.

Table 2

Differences between micro and small firms and micro and small technology-based firms

	Micro and Small Firms	Micro and Small Technology-based Firms
Goals and strategies	Gaining profits	Return of expenses in a concise period because of dynamic changes in technology
	Often passive or reactive strategy versus changes in the environment	Proactive, anticipating changes in the environment, especially opportunities and chances
	The need for more cooperation with other organizations focuses on producing material goods.	Intense, strategic domestic and international cooperation, especially with R&D centers
	Building competitive advantage based on capital and financial assets	Building competitive advantage based on knowledge, intellectual capital, and innovations
	Investing mainly in tangible assets	Investing in tangible and intangible assets with a high-risk factor
Production and technology	Mass and large series production of goods for mass consumers, long production batches, few patents, rare inventions	Production of goods involving resources of modern science and technology for an intelligent customer, short production batches, numerous patents and licenses, continuous innovation
	Large capital demand	Large scientific input demand
	Specialized plants	Variable processes plants
	Long changeover time of machines and technical equipment	High level of rotation of technical equipment; replacing with more modern and innovative devices
	Limited integration of production process (focus on partial processes)	High integration of production process (focus on making an innovative product)
	Micro and Small Firms	Micro and Small Technology-based Firms
People	High employment of production personnel	High employment of science and technical personnel as well as persons with knowledge
	Individual work or in permanently organized teams	Teamwork with significant mobility and diversity, as well as temporary participation
	Low creativity of personnel; heteronomy and frequent lack of independence in problem-solving	High creativity of personnel; creative thinking and autonomy: independent problem solving

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	Little training and skills improvement	Continuous training for improvement of qualification and development of personnel; team learning
	Disciplinary measures for mistakes	Learning from mistakes
Organizational structure	Traditional, focused on the functions of a company	Cooperation networks of self-managing entities focused on processes
	Hierarchy, monolithic, developed.	Weaker hierarchy links, domination of horizontal connections with virtual features
	Fixed and structured organization	High dynamics of change and flexible organization
	High centralization	High decentralization
	Formalized, mainly vertical communication	Communication via advanced information technologies, vertical and horizontal, often informal
	“Control-focused” management	“Support-focused” management
Management	Practicing stereotypes	Negating stereotypes
	Making decisions frequently based on intuition or within fixed procedures	Making decisions based on empirical data
	The high position of managers	Significant autonomy of employees, based on competences
	Avoiding uncertainty	Acceptance of uncertainty and permanent change

Source – Adapted from Zakrzewska-Bielawska (2010)

How STBFs are founded can influence their performance and development. STBFs are usually created from the knowledge and experience of managers, market opportunities, or partnerships with universities and research centers (Adam et al., 2018).

In one of Brazil's first publications on STBFs, Marcovitch et al. (1986) define them as high-tech companies founded to produce products/services with high technological content. Furthermore, Ferro and Torkomian (1988) indicated that such firms possess rare and exclusive competencies and use highly technical knowledge.

According to Côrtes et al. (2005), STBFs develop technologies to manufacture new products. However, for the authors, this definition distinguishes STBFs from firms that only modernize their productive and technological processes and whose operations focus on manufacturing products that already exist in the market.

2.4.1 Dynamic Capabilities in Micro and small technology-based Firms

By undertaking innovative efforts, STBFs reconfigure not only organizational resources but also develop new skills and capabilities; however, the existing relationships among STBFs, resources, and dynamic capabilities are not fully explained in the literature, especially when considering the specificities of STBFs, as a consequence, there is limited understanding of how resources and dynamic capabilities can affect the performance of these companies (Haapanen et al., 2018; Herrmann et al., 2017).

By making innovative efforts, STBFs reconfigure organizational resources and develop dynamic capabilities. The ability to reconfigure resources and capabilities as external environmental demands change makes dynamic capabilities, and their microfoundations help STBFs overcome their constraints and effectively develop innovation strategies (Haapanen et al., 2018; Sok et al., 2016). However, as STBFs may not have all the resources needed to innovate, share information, and strategically partner with clients, suppliers, employees, sales representatives, competitors, universities, departments, and government agencies, can help these companies meet their resource constraints, detect external opportunities and develop dynamic capabilities (Adam et al., 2018; Pan, Zhang, Song, & Ai, 2018; Haapanen et al., 2018).

As to programs to promote innovation supported by government agencies, Kenski and Marcondes (2017) they cited the Innovation Research in Small Businesses of the Foundation for Support and Research of the State of Sao Paulo (PIPE / FAPESP), whose main objectives are to support research in science and technology as an instrument to promote technological innovation and business development and increase the competitiveness of small businesses.

The workforce's training and qualification in human resources may differ from that of traditional micro and small businesses. For example, the managers may come from large companies, universities, or research centers, possessing a high educational level, innovative spirit, and the propensity to take calculated risks (Adam et al., 2018; Pan et al., 2018).

The possibility of reconfiguring resources and capabilities as external environmental demands change enables dynamic capabilities and microfoundations to help STBFs overcome their constraints and effectively build innovation strategies (Haapanen et al., 2018; Herrmann et al., 2017).

As far as the development of dynamic capabilities, the use of microfoundations provides task structures and skills that facilitate the understanding and management of different organizational activities and are therefore used by the STBFs, to fill, partially, a lack of organizational resources (Haapanen et al., 2018; Herrmann et al., 2017; Sok et al., 2016).

The microfoundation of reconfiguration allows STBFs to recognize, acquire, build, and manage innovative resources to achieve the enterprise's growth in an uncertain market environment (Pan et al., 2018). Also, without the reconfiguration of microfoundation, dynamic capabilities may not provide a sustainable competitive advantage and may only achieve temporary competitive advantages (Haapanen et al., 2018; Sok et al., 2016).

Besides, the development of microfoundations may depend not only on the accumulated behavior and knowledge of employees and managers but also on the proactivity to meet client needs, willingness to experiment with new ideas and strategies, disseminate organizational culture and encourage work teams (Adam et al., 2018; Jensen & Clausen, 2017).

3 Methodology

This research is exploratory, and a mixed research method was developed to achieve the proposed objective based on a survey conducted between May and June 2019 with a sample of 104 STBFs from Sao Paulo. The second qualitative phase was based on case studies, and information was collected through five semi-structured interviews with the managers of the STBFs between November and December 2019.

3.1 Choosing the five micro and small businesses investigated

Initially, the decision to study firms from São Paulo is justified because this state has social characteristics favorable for innovation, such as contributing 31% of the national GDP;

housing 25% of the country's universities; and hosting 50 business incubators, 28 technology parks, several innovation promotion agencies, and the Desenvolve São Paulo Bank—these factors facilitate the creation and development of STBFs (ANPROTEC 2019).

The sample analyzed in this study comprised 104 STBFs from Sao Paulo state that completed the survey questionnaire. The decision to study firms from São Paulo is justified because this state has social characteristics favorable for innovation, such as contributing 31% of the national GDP; housing 25% of the country's universities; and hosting 50 business incubators, 28 technology parks, several innovation promotion agencies, and the Desenvolve São Paulo Bank—these factors facilitate the creation and development of STBFs (ANPROTEC 2019).

The research questionnaire was structured based on theories about competitive and innovation strategies, dynamic capabilities, and STBFs and was divided into 4 sections: the first section covers registration information about the manager; the second section identifies whether the investigated STBFs define competitive and innovation strategies, whether they invest in R&D, whether they have R&D departments, and whether they carry out innovations by launching or improving processes, products, and services; the third section classifies the main variables that make up the external and internal environments and, finally, the fourth section presents the primary resources that STBFs use to innovate.

The launch and improvement of processes, products, and services were measured using a scale with intervals of 2 units, in which the manager noted only one class. The intervals used in this scale were: 0 to 2; 3 to 5; 6 to 8; 9 to 11; 12 to 14; 15 to 17; 18 to 20; 21 to 23; 24 to 26; 27 to 29 and ≥ 30 .

The importance of the external and internal environment variables was measured using a Likert scale ranging from 1 to 7, where 1 means totally unimportant and 7 means totally important, following the classification indicated by Barney and Hesterly (2012).

The questions about the definitions of competitive and innovation strategies, R&D investments, and developing an R&D lab were based on closed "yes and no" questions.

The search identified 589 companies, and questionnaires were e-mailed to them. Of these, 62 had information-related errors, and the managers did not return 423. Thus, 104 companies (17.65% of the total sample) completed the questionnaires correctly, and the results were considered valid and used in the data analysis.

The responses of 104 STBFs were submitted to cluster analysis, indicating three main clusters. These clusters, 2 out of 3 clusters were picked for case selection.

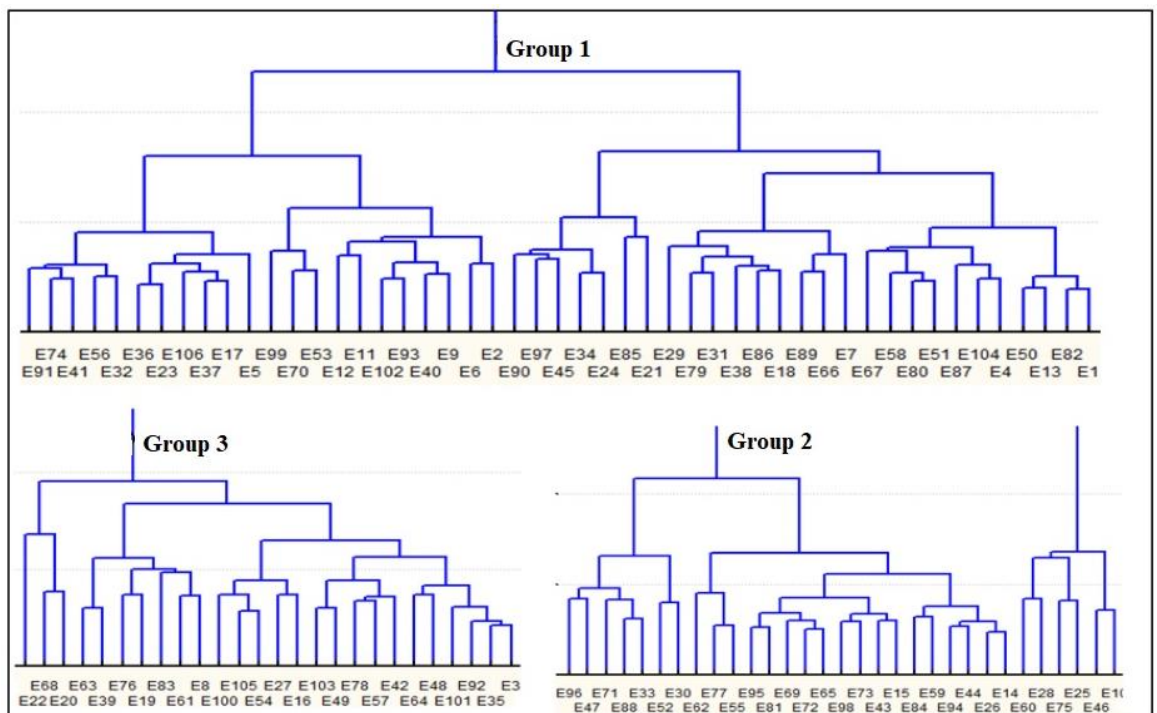
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In this work, cluster analysis can indicate whether the STBFs that most invested in R&D allocated organizational resources to innovate and monitored the external environment variables are contained in the group of companies that most innovated, launching and improving processes, products, and services. The three groups formed by cluster analysis are shown in Figure 1.

In the first cluster, with 48 companies, there were companies with higher values for the percentage of the variable invested in R&D, organizational resources, and external environment variables. The second cluster gathered 31 companies with higher values for annual turnover, launching and improving processes, products, and services. The third cluster of 25 companies is the group with a higher number of employees and lower values for the variable's percentage invested in R&D, organizational resources, and external environment variables. The third cluster was discarded because, out of 25 MPEBTs, 17 were medium and big companies, and only two enterprises operated in the industrial sector. Including companies in the service sector would imply the expansion of variability factors. In addition, it would be more challenging to compare cases because the activities performed in the industrial and service sectors can be very different.

Figure 1

Results of clusters analyses



Source – Own elaboration

The external environment variables used for each company to assess the dynamism of its sector were: competitors, dynamism, uncertainty, changes in customer demand patterns, need for innovation, technological obsolescence, market opportunities, and pressure on prices (Adam et al., 2018; Haapanen et al., 2018; Herrmann et al., 2017; Jeng & Pak, 2016).

The quantities launched and improved processes, products, and services were divided into 11 innovative classes, with each manager indicating only one class for each type of innovation. For R&D investments, the same 11 classes were maintained, meaning percentages invested in R&D to annual revenues and not quantities of innovations.

The size of the companies was evaluated based on the classification, according to the number of employees, used by the Brazilian Micro and Small Business Support Service (SEBRAE, 2015).

Among the two clusters chosen, the companies in the first cluster (STBFs A, B, and C) were the ones that marked the most significant classes (most considerable quantities) of R&D investments and classified most of their organizational resources as necessary for innovation (values 5, 6, and 7 on the Likert scale). In turn, the companies in the second cluster (STBFs D and E), although they did not invest the exact percentages in R&D and did not classify most of their resources as essential to innovate (values 5, 6, and 7 of the Likert scale) were the companies that indicated the highest amounts of innovations.

The five STBFs chosen in the quantitative stage were analyzed in depth in the qualitative stage. For this, an interview script was prepared containing 24 questions. This script was based on theories about competitive and innovation strategies, innovation, the formation of dynamic capabilities, and the answers of the 104 managers.

The 24 questions of the interview script were divided into 5 sections, according to the following explanation: In the first section, there was the characterization of the company and the manager. In the second section, there were questions about the competitive strategy adopted by the company. The third section emphasized the adoption of innovation strategies. The fourth section addressed quantities of innovations launched and improved in processes, products, and services. Finally, the fifth section presented the process of formation of dynamic capabilities.

3.2 Sample characteristics

The 5 STBFs selected for the case studies presented the following characteristics: STBFs A and B invested more than 20% of their budgets in R&D, allocated resources to innovate, considering most of these resources as necessary (values 5, 6, and 7 of the Likert

scale), defined competitive and innovation strategies and innovated, having indicated launches and improvements in processes, products, and services in classes between 1 to 2 and 3 to 5 innovations.

STBF C invested between 3% and 5% of its budget in R&D, allocated resources to innovate, considering most of its resources as necessary (values 5, 6, and 7 of the Likert scale), defined only competitive strategy and innovated, indicating that launches and improvements of processes, products, and services were distributed between classes 1 to 2 and 3 to 5 innovations.

STBFs D and E have a higher revenue compared to previous companies and allocated resources to innovate, but did not indicate that most organizational resources are essential to innovate (values 5, 6, and 7 of the Likert scale), defined competitive and innovation strategies and obtained more innovations, indicating values higher than 18 innovations.

The data obtained in the quantitative stage provided subsidies, not only for the choice of the 5 STBFs that were analyzed in the qualitative stage but also presented information for the preparation of the interview script. This script was divided into 4 sections as follows:

The first section presents registration information about the 5 interviewed managers. The second section indicates whether the STBFs define competitive strategies; whether they establish short and long-term objectives, and how they characterize the sector in which they operate; the third section shows whether the firms define innovation strategies; whether to invest in R&D; or have R&D departments, whether to launch and improve processes, products, and services, and whether to have patents or copyrights to protect their innovations; finally, the last section evaluates whether the STBFs develop dynamic capabilities and how they do to sense, seizing and reconfigure organizational resources in the face of external opportunities.

The five interviews were recorded and transcribed separately, respecting the completeness of the statements, and were analyzed by the Content Analysis technique (Graneheim & Lundman, 2004). As the objective of this work is to identify the types of resources that STBFs allocate to develop dynamic capabilities, the use of the qualitative method through semi-structured interviews and the technique of content analysis allowed us to know, in more detail, topics such as characteristics of the sectors in which each STBF operates, organizational resources, types of innovation and dynamic capabilities, including its micro-foundations.

4 Results of Case Studies

In this section, the main features of the strategic behavior of the STBFs will be presented, with information on the definition of competitive and innovation strategies, allocation of organizational resources, and the development of dynamic capabilities.

4.1 Characterization of micro and small technology-based firms

STBF A was founded in 2005 based on the knowledge and experience accumulated by the manager, operates in the sector of medical-ophthalmological products, produces equipment for diagnosing ophthalmic diseases, and currently employs 47 employees. STBF B, which also operates in the sector of medical-ophthalmological products, produces equipment for diagnosing ophthalmic diseases; founded in 1992, based on knowledge and experience accumulated by the manager, and currently employs 16 employees. STBF C was founded in 2005, based on business opportunities, operates in the sector of manufacturing devices for measurements, tests, and controls, producing electronic identifiers and trackers for cattle, goats, and buffalo, and currently employs six employees. STBF D was founded in 2006, based on business opportunities, operates in electronic management of documents and processes, and employs 21 employees. Finally, STBF E was founded in 2005 based on knowledge and experience accumulated by the manager, operates in the industrial automation sector producing, under customer demand, electronic boards for industrial automation, and currently employs 40 employees.

4.2 Definition of competitive strategy and Innovation

Manager A, with a degree in administration, and Manager B, with a degree in electrical engineering, characterized the medical-ophthalmological products sector as dynamic, dependent on foreign suppliers, and regulated and inspected by bodies such as the Brazilian Association of Technical Standards (ABNT), National Health Surveillance Agency (ANVISA) and National Institute of Metrology, Quality, and Technology (INMETRO). Because of these sector specificities, STBF A defined but did not formalize competitive and innovation strategies and communicated strategic deliberations to employees. STBF B defined and formalized competitive and innovation strategies and communicated strategic deliberations to employees. Manager C, with a degree in mechanical engineering, defined the apparatus manufacturing

sector for measurements, tests, and controls as could be more dynamic, with high fiscal and tax burdens, and dependent on customers' specific demands. Faced with these sector characteristics, Manager C defined, but did not formalize, competitive and innovation strategies and only communicated deliberations about the competitive strategy to his employees. Manager D, with a degree in administration, defined the electronic document management sector as dynamic due to the constant changes in the laws that regulate data and information management, high technological obsolescence, and competition with large multinational companies. Faced with such sectorial characteristics, company D defined and formalized competitive and innovation strategies and communicated strategic deliberations to employees. Manager E, with a degree in visual arts and specializing in people management, defined the industrial automation sector as dynamic, with high technological obsolescence rates and influence from competitors and importers. With these sectorial characteristics, enterprise E defined and formalized its competitive strategy, defined but did not formalize its innovation strategy, and communicated strategic deliberations to the employees.

In short, the STBFs investigated act in dynamic, uncertain sectors with high rates of technological obsolescence and dependent on specific customer demands, presented a pattern of strategic behavior to define competitive and innovation strategies, and most formalized only the competitive strategy. All communicated the strategic deliberations to employees.

4.3 Organizational resources

Some organizational resources that STBFs A and B use to meet the demands of their customers (ophthalmologists) who, by attending international congresses, usually acquire and demand technologically advanced products were government subsidies through agencies to promote innovation, training, and qualification of their employees, investments in R&D and maintenance of its departments. In addition, especially regarding acquiring and disseminating knowledge, while STBF A primarily uses consulting and third-party knowledge to discuss new market needs with employees, STBF B encourages employees to interact directly with ophthalmologists and their patients by participating in campaigns that raise awareness of chronic diseases among the population.

STBFs A and B also used resources from innovation promotion agencies (PIPE/FAPESP and the bank Desenvolve São Paulo) to develop innovative projects. Although Kenski and Marcondes (2017) indicated that innovation agencies/programs, significantly PIPE/FAPESP,

can help MPEBTs to allocate organizational resources to innovate and develop dynamic capability, this research indicated that only STBFs A and B obtained funding from innovation agencies. Some organizational resources that STBF C uses to meet the specific demands of its customers are to act proactively, seeking to anticipate the new market requirements, participating in national and international trade fairs, and making strategic partnerships with companies in other sectors. The resources STBF D uses to develop and commercialize electronic document management software are employee training and qualification, investments and maintenance of the R&D departments, changes in organizational culture, and strategic partnerships with customers. Some of the resources listed by STBF E (training and qualification of employees, investments, and development of the R&D department, and strategic partnerships with customers and companies from other sectors) were destined to produce on-demand boards for industrial automation. As the company has customers in various sectors with several technological needs, the enterprises have developed technologies enabling them to meet customer demands.

Table 3 shows the organizational resources that the STBFs used to innovate.

Investments in R&D, market research, and technology were mentioned by all the STBFs mentioned investments in R&D, market research, and technology. However, in STBF C, the R&D investments did not include structuring an R&D department. Furthermore, besides the resources common to all STBFs, resources exclusive to companies that act in sectors with different environmental characteristics were identified: some organizational resources in STBFs A, B, D, and E as training and qualification of employees, hiring of consulting companies, development of R&D departments and knowledge management were not in STBF C. In contrast, organizational resources such as lean organizational structure, participation in lectures, and use of SEBRAE consulting services were cited only by STBF C.

Table 3

The primary resources of the five STBFs

Organizational resources	Enterprises				
	A	B	C	D	E
Promotion agencies for innovation	X	X			
Training and qualification of employees	X	X		X	X
Consultancies	X			X	X
Organizational culture				X	X
R&D departments	X	X		X	X
Retailers	X			X	
Organizational structure			X		
Suppliers		X			
Knowledge management		X			X
R&D investments	X	X	X	X	X
Logistics					X
Partnerships with customers		X	X	X	X
Partnerships with companies from other sectors			X		X
Partnerships with foreign companies	X				
Partnerships with universities	X				
Participation in fairs	X	X	X		X
Participation in lectures			X		
Market research	X	X	X	X	X
Financial resources	X		X		X
Trade representatives	X				
Company reputation					X
SEBRAE consultancy			X		
Technology	X	X	X	X	X

Source – Own elaboration

Internal characteristics of STBF E, not found in STBF C, as a way of funding from knowledge and experiences of the manager, training, and qualification of employees, knowledge management, organizational culture, innovative reputation, and maintenance of R&D departments help to explain differences in the allocation of organizational resources and the definition and formalization of strategies.

In short, the five STBFs allocated organizational resources to innovate, especially investments in R&D, maintenance of R&D departments, training and qualification of employees, and making strategic partnerships with external agents to meet customers' specific demands. These results corroborate with Jensen and Clausen (2017) by indicating that STBFs rely on different types of knowledge and technologies to innovate.

4.4 Development of dynamic capabilities

STBFs A and B use the employees' knowledge and external agents, especially customers (ophthalmologists), to sense external opportunities and reconfigure their organizational resources. Manager B also encourages his employees to interact directly with ophthalmologists and their patients through social campaigns that aim to raise awareness about chronic diseases so that employees discover, in practice, how to correct any flows in the project and discover new features for the product. For Manager A, seizing the company resources can be negatively influenced by the lack of adequate human and financial resources.

Manager C uses his accumulated knowledge, experience, and company resources to develop new projects and reconfigure organizational resources. As a result, the company has already developed products for the veterinary and food sectors.

Manager D also uses employees' knowledge and customer demands to sense external opportunities and reconfigure organizational resources. Employee information relates to knowledge management, which aims to transform knowledge into something valuable and practical for the company. Learning must be constant for employees to develop new functionalities for the electronic document management platform. For instance, the General Personal Data Protection Act (LGPD) compelled national companies to adopt formal electronic document management techniques. This way, STBF D had to adapt to clients' different demands from various sectors.

Manager E uses the employees' knowledge and financial and logistical resources to sense external opportunities and reconfigures organizational resources as innovation requires investments; companies that want to innovate need to invest in projects and prototypes. In addition, logistic resources are related to the internal structuring process of the company that, by optimizing internal communication and processes, should bring speed and agility to the production and delivery of products to customers. Table 4 shows the dimensions of microfoundations that the STBFs investigated used to develop dynamic capabilities.

The variables/resources indicated by all the STBFs investigated to develop dynamic capabilities were: strategic partnerships with external agents, capacity to interact with the market, coordination of strategic partnerships to obtain organizational resources, and customer-based learning capacity at the reconfiguration stage.

Table 4

Dimensions of sensing, seizing, and reconfiguration microfoundations

		Enterprises				
Dimensions of microfoundations		A	B	C	D	E
Dimensions of sensing microfoundation	Training and qualification	X	X		X	X
	Share ideas and suggestions for improvements.		X		X	
	Knowledge and experience accumulated by managers			X		X
	Develop reliable relationships with external agents.	X	X	X		X
	Explore scientific and technological opportunities.					X
	Identify new market segments and new customer needs	X			X	X
	Incorporate knowledge acquired from customers.		X		X	X
	Observe customers empathically, trying to understand specific feelings, daily practices, desires, and lifestyles.		X			X
	Processes to direct investments in R&D	X			X	
Dimensions of seizing microfoundation	Ability to interact with the market	X	X	X	X	X
	Organizational compatibility (culture, motivation, decision-making, form, division of labor, and conflict resolution)		X			X
	Understand customer consumption habits and mean barriers to the adoption of innovative solutions.		X		X	X
	Coordinate partnerships to obtain organizational resources.	X	X	X	X	X
	Establish and maintain communication channels.	X				X
	Organizational structure and infrastructure				X	X
	Strategic planning	X	X			
	Organizational processes					X
	Financial and human resources	X			X	
	Reduce uncertainty by presenting reasons, responsibilities, and benefits transparently.		X			X
	Informal labor relations and unbureaucratic administration			X		X
	Routines to facilitate decision-making and encourage employee loyalty and commitment					X
	Solutions for customers and business models (selection of target customers, value delivery, selection of technologies, and customer orientation)		X	X	X	X
Dimensions of reconfiguration	New knowledge from partnerships with universities	X				
	Learning capability based on external partnerships and information sharing	X		X		
	Customer-based learning capabilities		X	X	X	X
	Configuration of technological resources	X	X		X	X
	Knowledge and experience accumulated by managers			X		X
	Decentralization: delegation of tasks to third parties so that which company focuses on its core competencies		X			X
	Knowledge management:	X	X		X	X
	Ability to change organizational routines					X
	Maintenance of hierarchical flexibility			X		X
	Human and financial resources	X			X	

Source – Own elaboration

In addition to the variables/resources cited by all the STBFs investigated, an analysis of variables unique to STBFs operating in sectors with different environmental characteristics was conducted. For example, although the STBF C developed dynamic capabilities, detecting external opportunities and mobilizing and reconfiguring organizational resources to take advantage of them, the company developed such capabilities with variables indicated by other STBFs investigated. In turn, variables such as learning and training of employees, understanding of customer consumption habits and main barriers to adopting innovative solutions, the configuration of technological assets, and knowledge management were not identified in the STBF C and, therefore, cited exclusively by STBFs who operate in sectors with higher levels of dynamism, uncertainty, and technological obsolescence.

5 Discussion of Results

The variables from the external environment, definition and formalization of competitive and innovation strategies, allocation of resources to innovate, and development of dynamic capabilities indicate the strategic behavior of the STBFs. The strategic behavior helps to explain how STBFs survive and obtain competitive advantages in their sectors by adapting their organizational specificities to the characteristics of each sector. This work is close to the results of Haapanen et al. (2018), Jeng and Pak (2016), and Sok et al. (2016), who indicated that strategic actions, especially the development of dynamic capabilities, can help STBFs overcome their restrictions and obtain a competitive advantage.

External variables help to characterize each sector of activity and explain how each STBF defines and formalizes competitive and innovation strategies and allocates organizational resources to innovate and develop dynamic capabilities.

The STBFs A, B, D, and E, which operate in more dynamic, uncertain, and with high rates of technological obsolescence sectors, have tended to define competitive and innovation strategies and communicate strategic deliberations to employees. In contrast, STBF C, which operates in a sector with lower levels of dynamism, uncertainty, and technological obsolescence, tended to define but not formalize competitive and innovation strategies and communicate only deliberations about the competitive strategy to its employees.

To deal with different levels of dynamism and environmental uncertainty, all STBFs have innovated, using organizational resources such as investments in R&D, new technologies, market research, development of strategic partnerships with customers, and participation in fairs. These differences can be explained, as indicated by Haapanen et al. (2018) and Turulja

and Bajgoric (2019), by the characteristics of the sectors of operation and by internal resources developed and allocated in each company, which compel STBFs to seek ways to interact with external variables, defining business strategies, communicating strategic deliberations to employees, allocating resources to innovate and developing dynamic capabilities.

For example, more resources allocated by STBF E to develop dynamic capabilities were responses to the characteristics of the sector in which it operates. Given its dynamic nature, with high technological obsolescence and offering products to several sectors, the companies which operate in it must constantly use means to detect external opportunities and reconfigure resources to meet the new technological demands of its customers. In such an environment where competitive advantages can be temporary, developing dynamic capabilities becomes a factor of competitive advantage for STBFs, as indicated by Adam et al. (2018) and Sheng (2017).

In turn, smaller amounts of resources allocated by STBF C to develop dynamic capabilities can also be explained by the characteristics of the sector where its customers operate. This sector, which is less dynamic and with a lower level of technological obsolescence, makes farmers demand products from manufacturers who use traditional productive attributes such as reliability, delivery time, and price instead of adding value to their products by using new technologies.

Despite operating in the same sector, STBFs A and B have allocated different resources to develop dynamic capabilities and have defined competitive and innovation strategies. As a result, the different strategic behaviors presented by STBFs A and B cannot be explained exclusively by the sector's characteristics. Consequently, specific management characteristics of the STBFs as a way of funding, time to market, structuring of organizational departments, knowledge management, and acceptance and credibility of products before clients reflect differences in the strategic behavior of these companies and differences between their own competitive and innovation strategies.

As indicated by Adam et al. (2018) and Jensen and Clausen (2017), this work shows that the development of dynamic capabilities can depend on resources such as knowledge and experience accumulated by managers and employees, development of business strategies and strategic partnerships with external agents (especially with customers), investments in R&D and ability to interact with the market.

Strategic partnerships with external agents, especially with customers, and the strategic sharing of information can make STBFs overcome their organizational constraints, thus

facilitating the detection of external environmental opportunities to innovate. Such results corroborate with Adam et al. (2018), Haapanen et al. (2018), Kenski and Marcondes (2017), and Pan et al. (2018).

6 Conclusions

This work was developed to identify traces of strategic behavior in STBFs from Sao Paulo. These companies, acting in several economic sectors, such as the production of medical and ophthalmologic equipment, manufacturing of devices for measurements, tests, and controls, electronic management of documents, and industrial automation, which have different technological demands and levels of environmental dynamism, allocate different organizational resources to meet the demands of each sector.

Organizational resources, when used by STBFs that act in sectors with high levels of dynamism, uncertainty, and technological obsolescence, with constant changes in patterns of customer demands and with lower product life cycles, tend to be reconfigured more frequently as a way to ensure survival and to obtain competitive advantages to STBFs that act in sectors with lower levels of dynamism, uncertainty, and technological obsolescence and that value traditional productive attributes such as product quality and cost reliability. Besides, developing dynamic capabilities can assist in the reconfiguration of organizational resources.

The development of dynamic capabilities is conditioned by characteristics/variables of external and internal organizational environments. In this work, the external environment was evaluated by variables that characterize the sectors in which companies operate, such as environmental dynamism, technological obsolescence, government regulations, and strategic partnerships. The studies carried out here indicate that MPEBTs that act in fewer dynamic sectors and with fewer technological levels allocate fewer resources, develop fewer dynamic capacities, and tend not to formalize strategies compared to MPEBTs that act in more dynamic and technological sectors.

As for the internal environment, MPEBTs, which employ knowledge and experiences accumulated by the manager and invest in the training and qualification of employees in knowledge management, and the development of an appropriate organizational culture, have more favorable conditions for the acquisition of dynamic capabilities.

This work indicated that the strategic behavior in MPEBTs from Sao Paulo can be described initially by the definitions of competitive and innovation strategies, formalization of the competitive strategy, and communication of strategic deliberations for the employees. Next,

the allocation of organizational resources to innovate and the development of dynamic capabilities was identified by factors/resources such as knowledge and experience accumulated by managers and employees, development of business strategies and strategic partnerships with external agents (especially with customers), investments in R&D, development, and maintenance of R&D department and ability to interact with the market. Finally, strategic behavior can be influenced by sector characteristics, with an emphasis on dynamism, uncertainty, and technological obsolescence.

This work by indicating that technological sectors with different levels of dynamism, uncertainty, and technological obsolescence do STBFs to behave in a plural manner concerning R&D investments, the definition of an R&D laboratory, quantities of innovations launched and improved processes, products, and services, and quantities of resources allocated to innovate, can help STBF managers to understand the structural characteristics of their sectors and, based on this information, present a strategic behavior that helps them obtain competitive advantages.

The case studies presented the conditions and contexts of the companies analyzed, which had their strategic behaviors identified. However, they do not allow a generalization of the results found. Therefore, future surveys may be developed to identify the types of organizational resources that MPEBTs allocate and patterns of dynamic capacity development.

AUTHORS' CONTRIBUTIONS

Contribution	Musetti, T. F.	Alves Filho, A. G.	Nagano, M. S.
Contextualization	X	X	
Methodology	X	X	X
Software	X	X	X
Validation	X	X	
Formal analysis	X	X	X
Investigation	X	X	X
Resources	X	X	
Data curation	X	X	
Original	X	X	
Revision and editing	X	X	X
Viewing	X		
Supervision		X	
Project management	X	X	
Obtaining funding	X	X	

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